FLATHEAD RIVER INSTREAM FLOW STUDY 9502500

SHORT DESCRIPTION:

Conduct IFIM study on Flathead River from South Fork confluence to Flathead Lake. Determine effects of flow fluctuations on fish habitat, predator prey interactions, sediment deposition and fish migrations. Link river model to existing reservoir model (HRMOD).

SPONSOR/CONTRACTOR: MDFWP/CSKT
Montana Fish, Wildlife & ParksConfederated Salish and Kootenai Tribes
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SUB-CONTRACTORS:

Not selected yet, RFP in prep.

GOALS

GENERAL:

Supports a healthy Columbia basin, Maintains biological diversity, Increases run sizes or populations, Provides needed habitat protection, Adaptive management (research or M&E)

RESIDENT FISH:

Habitat

NPPC PROGRAM MEASURE:

10.3A.18

RELATION TO MEASURE:

IFIM type river modeling will provide tool to balance reservoir and river operations for maximum possible benefit to fish, within the realities of power and flood control.

OTHER PLANNING DOCUMENTS:

Hungry Horse Mitigation and Implementation PlanKerr Mitigation / FERC relicensing documentsExcessive Drawdown Mitigation workplan and project reports.

TARGET STOCK	LIFE STAGE	MGMT CODE (see below)
Rainbow trout	All	A,N
Mountain whitefish	All	N
Westslope cutthroat trout	All	S,N,W
Bull trout	All	(P),N,W

AFFECTED STOCK	BENEFIT OR DETRIMENT
Northern squawfish, northern pike, yellow perch, pumpkinseed	Detrimental
Eastern brook trout	Detrimental

BACKGROUND

STREAM AREA AFFECTED

Stream name:

Flathead River

Subbasin:

Upper Columbia

Stream miles affected:

44

Land ownership:

both

Hydro project mitigated:

Hungry Horse Dam

Habitat types:
River

HISTORY:
This project is scheduled to start in 1997. This effort is similar to the ongoing work in Libby Reservoir and Kootenai River.

PROJECT REPORTS AND PAPERS:
Project has not begun. This product will link with the IRCs described in: Model Development to Establish Integrated Operational Rule Curves for Hungry Horse and Libby Reservoirs, Montana. January 1996.

ADAPTIVE MANAGEMENT IMPLICATIONS:
The effects of rapid or unnatural flow fluctuations of riverine biota is well document in the literature. Thermal control (selective withdrawal) coupled with a nearly natural flow regimen is critical to riverine health in the Flathead River. Improved prey production and fish growth efficiency will aid in the recovery of weakened native fish populations (e.g. bull trout and westslope cutthroat).

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:
Determine seasonal thresholds for allowable flow fluctuations (ramping rates). Define the required flow (augmented by Hungry Horse Dam) for stream channel maintenance (to clean stream substrate and maintain insect production). Evaluate the feasibility of using flows and temperatures as a tool to reduce predation on juvenile bull trout and westslope cutthroat.

CRITICAL UNCERTAINTIES:
Ongoing actions for recovery of the endangered Snake River salmon as directed by the NMFS Biological Opinion could influence the timing of water released from Hungry Horse Dam. Unless we understand the effects of these releases, recovery actions may counter or reverse mitigation efforts to balance the needs of resident and anadromous fish.

BIOLOGICAL NEED:
The NPPC program calls for consultations with MFWP and CSKT when conflict occurs between reservoir and river requirements. River flows and flow fluctuations cause important changes in food production, habitat availability and fish movements. An annual flow regime with tolerable flow fluctuations is needed to maximize the effectiveness of the selective withdrawal structure and to balance riverine productivity with hydropower production.

HYPOTHESIS TO BE TESTED:
Rate of flow change X is more beneficial to riverine biological production than is flow change Y (X and Y are rates selected from the continuum from minimum to maximum flows). The effect of ramping rates varies seasonally (due to the presence or absence of critical life stages of resident fish). River flows effect: (1) the movements of fish; (2) the availability of suitable habitat, and; (3) food production.

ALTERNATIVE APPROACHES:
Ongoing analysis of alternatives

JUSTIFICATION FOR PLANNING:
N/A

METHODS:
(1) Standard application of Instream Flow Incremental Methodology in three reaches of the Flathead River (PHABSIM and HABSP). Optimization program to link the river IFIM and the reservoir model HRMOD will draw heavily from ongoing modeling in the Kootenai system. (2) Modeling typically uses the simplest mathematical tools to make maximal use of available empirical data. Non-linear regression multi-variate analysis, etc. the IFIM will be subcontracted to a competitive contractor. Project design and statistical analyses will be reviewed/edited by University statistical consultants. (3) Target species include bull

trout, westslope cutthroat and northern squawfish (native), lake trout and northern pike (non-native).

PLANNED ACTIVITIES

SCHEDULE:

Planning Phase **Start** 1997 **End** 1997? **Subcontractor** none

Task Planning will be completed through bid process in FY97. Bid will be awarded in FY97?; project implementation will begin as soon as possible. A validation plan will also be developed.

Implementation Phase **Start** 1997 **End** 2000 **Subcontractor** Not awarded

Task (1) Establish IFIM transects for hydraulic measurements. (2) Initiate data collection at all transects. (3) Compile and proof data sets. Project will move from macro to microhabitats during the first three-year project, the fourth year will be used for implementation and reporting.

PROJECT COMPLETION DATE:

2000

CONSTRAINTS OR FACTORS THAT MAY CAUSE SCHEDULE OR BUDGET CHANGES:

The time it will take to start this project remains uncertain.

OUTCOMES, MONITORING AND EVALUATION

SUMMARY OF EXPECTED OUTCOMES

Expected performance of target population or quality change in land area affected:

Project will recommend an annual regime of flows and allowable flow fluctuations to balance riverine fish production with hydropower generation. River model will be linked with the existing reservoir model to assess tradeoffs when reservoir and river requirements conflict. Thermal control via selective withdrawal on the dam and moderation of flow fluctuation will return the river to a more natural state, improving insect production and fish growth.

Present utilization and convservation potential of target population or area:

Recreational use of the river is increasing. Water temperatures are now back to nearly natural condition (selective withdrawal at H. Horse Dam) for the first time since 1952. Water quality has improved somewhat during the last decade due to improved land management practices, but has always remained relatively pristine. Flow fluctuation due to hydropower generation and reduction of the spring freshet due to flood control remain the greatest threat to riverine health. Other impacts such as the loss of riparian vegetation, chemical runoff from lawns and fields, channelization and impoundment (backwater effect caused by unnaturally high Flathead Lake elevations during the historic low flow period) remain impediments to system recovery. Bull trout in the main stem Flathead River have declined alarmingly during the last five years, apparently due to habitat loss and food web interactions or competition with introduced species (eg. Lake trout, mysis shrimp, eastern brook trout). Westslope cutthroat have also shown signs of decline. The fishery has persisted since dams were installed on the system despite gross changes to the natural environment, but the food web is now destabilized and changing (synergy?). Restoration of more natural river function is possible through seasonal ramping limits, periodic flushing flows, and thermal control. Thermal control is complete. The flow related aspects can be developed through this project.

Assumed historic status of utilization and conservation potential:

Native species assemblage, natural river.

Long term expected utilization and conservation potential for target population or habitat:

Protect what remains, restore what we can.

Contribution toward long-term goal:

IFIM data on the lower Flathead River will define acceptable flow fluctuation balanced with power production, flood control, reservoir elevations and anadromous species recovery.

Indirect biological or environmental changes:
Normalized river function provides benefits for terrestrial species as well as aquatic.

Physical products:
More natural flows in 44 river mile of the Flathead River which are a migration corridor for the unregulated North and Middle Forks bordering Glacier National Park.

Environmental attributes affected by the project:
Limits to flow fluctuations or seasonal flow constraints may have minor to moderate impacts on power generation at Hungry Horse Dam and Kerr Dam at the outlet to Flathead Lake.

Changes assumed or expected for affected environmental attributes:
Moderation of unnatural flow fluctuation, combined with thermal control, will improve biological production and fish growth potential. Temperature control alone will make a big difference, but both are needed to maximize benefits.

Measure of attribute changes:
A goal, but unquatifiable at this time (work hasn't begun).

Assessment of effects on project outcomes of critical uncertainty:
This will be done under the Hungry Horse Mitigation Program: population monitoring, sampling of primary production using C14 scintillation, chlor a, zooplankton density and vertical distribution, benthic insect grabs, fish food habits, growth rate evaluation (scale and otolith), migrant trapping, riparian revegetation evaluation, hydrographic monitoring. We will also learn much by communication with operating agencies (BPA,BOR,ACOE) and ESA implementers (NMFS,USFWS).

Information products:
Contractor report, seasonal ramping rates, flushing flow requirements, substrate mapping.

Coordination outcomes:
See above

MONITORING APPROACH
(1) Standard application of Instream Flow Incremental Methodology in three reaches of the Flathead River (PHABSIM and HABSP). Optimization program to link the river IFIM and the reservoir model HRMOD will draw heavily from ongoing modeling in the Kootenai system. (2) Modeling typically uses the simplest mathematical tools to make maximal use of available empirical data. Non-linear regression multi-variate analysis, etc. the IFIM will be subcontracted to a competitive contractor. Project design and statistical analyses will be reviewed/edited by University statistical consultants. (3) Target species include bull trout, westslope cutthroat and northern squawfish (native), lake trout and northern pike (non-native).

Provisions to monitor population status or habitat quality:
Excessive Drawdown Mitigation Project: predator / prey interaction, species seasonal movements. Mitigation and Implementation Plans, Flathead Basin Commission Master Monitoring Plan

Data analysis and evaluation:
See above

Information feed back to management decisions:
Adaptive management will guide future direction. Things that produce measurable results will continue, things that do not work will be modified or discontinued.

Critical uncertainties affecting project's outcomes:
The main issue here is when the IRCs will be implemented. Scientific review has taken place and concurred with this approach. Yet, policy direction has not allowed any deviation from the NMFS Biological Opinion. We are constantly assured that the BiOp is "a living document" with flexibility to change as new information becomes available, but no change in implementation has occurred. ESA actions must be based on the best available science. Policy makers should assure this occurs.Specific to this project, flow ramping has no real effect on downstream water availability because only diel timing is effected. Power concerns will be addressed similarly to other non-power constraints; with a realistic balance in mind.

EVALUATION
Biological response in the river. Periodic assessment of insects (repeat the work of Perry and Hauer) and fish (otolith growth, population estimate, creel census)

Incorporating new information regarding uncertainties:
Our track record has shown that we readily accept and adapt to new information. Scientific principal leads us to search for the truth. If we are wrong we admit it and gratefully accept the correction, this makes our product better.

Increasing public awareness of F&W activities:
Its a highly visible project. The media will be told this is part of a regional effort.

RELATIONSHIPS

RELATED BPA PROJECT	RELATIONSHIP
9101903 Hungry Horse Mitigation	Implements mitigation plan
8446500 Libby and Hungry Horse Tech. Analysis	Funds one modelor to build an optimization model to link river model to existing reservoir model HRMOD
9501200	Project is high priority for funding, but can not begin until the IRCs are implemented. Will assess the effectiveness of the IRCs for Hungry Horse after implementation

RELATED NON-BPA PROJECT	RELATIONSHIP
Project 9101904 is another aspect of the mitigation project conducted by the USFWS	USFWS provides hatchery support for the kokanee restoration test, experimental culture of bull trout to determine imprint timing and assists with monitoring of hatchery plants
Project 9101901 is another aspect of the Hungry Horse mitigation program conducted by the Confederated Salish and Kootenai Tribes and USFWS	CSKT is a full cooperator in Hungry Horse Mitigation. Tribal personnel repair habitat and perform monitoring on the southern portion of Flathead Lake and River

OPPORTUNITIES FOR COOPERATION:
The ability to implement an appropriate flow regimen is dependent on a balanced system operation. River work compliments ongoing research on selective withdrawal and predator prey interactions. Partnerships can be formed with the Flathead Basin Commission, Bureau of Reclamation, Flathead River action groups and landowners along the river. Partnerships have already been demonstrated with BOR and BPA (including ramping rates, minimum flows and kokanee spawning flows).

COSTS AND FTE

1997 Planned: $95,600

FUTURE FUNDING NEEDS: **PAST OBLIGATIONS (incl. 1997 if done):**

FY	$ NEED	% PLAN	% IMPLEMENT	% O AND M
1998	$100,000			100%
contracted				
1999	$100,000			100%
2000	$100,000			100%
2001	$0			100%

LONGER TERM COSTS: MFWP but costs cannot be even estimated until watershed planning is in its later stages.

1997 OVERHEAD PERCENT: 17%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:
[Overhead % not provided so BPA appended older data.] Salaries only

CONTRACTOR FTE: One

SUBCONTRACTOR FTE: Potential for one-quarter time fte